APPENDIX X

Concord Transportation Plan Committee
Final Report & Recommendations
With Appendices

Regarding

Traffic Calming and Traffic Management

In the Town of Concord

Prepared by:

Daniel B. Hogan, Chair
Dan Brand, Co-Chair
John Hollywood, Co-Chair
Elissa Brown
Nancy Carr
Dan Gainsboro
Phil Lawrence

With Bonnie Polin
of
Bruce Campbell & Associates

January 24, 2000

Executive Summary

Our charge from the Board of Selectpersons (BOS) has been to develop a transportation plan for the Town of Concord that would provide a framework for the Town to use in addressing various transportation-related issues. The Committee was to include in its study an overview of the impacts of vehicular traffic on all local and state roads, mass transit ridership and service, and pedestrian and bicycle issues as they relate to providing safety from vehicular traffic.

As an overarching response to this charge, the Transportation Plan Committee urges the Town of Concord's BOS to make a long-term and significant commitment to traffic calming and traffic management throughout the Town. The purpose should be to minimize cut-through traffic on local streets and decrease traffic volumes in our downtown areas. The Transportation Plan Committee has adopted a clear-cut goal to protect the quality of life of our residents and to provide for their safety in keeping with the open, rural and historic character of the town. The BOS should oversee the revision of the charge of each relevant Committee and Department in town (including itself) to incorporate goals, objectives and reporting mechanisms in this area. We recommend the creation of a Town-staffed group to respond to petitions and initiate traffic-calming and traffic-management measures. A potential name for this group is the Traffic Calming Group (TCG), and we will hereinafter refer to it as the TCG. We propose several potential levels of budgetary commitment on the part of the Town. And finally, we strongly recommend that the Town of Concord should work with other Towns in the region in a coordinated fashion to deal with this problem.

Below is a summary of our key recommendations:

Philosophy, General Principles and Priorities

- Where applicable and appropriate, the BOS and relevant Town Departments and Committees should adopt the following objective for traffic-calming and transportation purposes:

  "To protect the quality of life of our residents and to provide for their safety in keeping with the open, rural and historic character of the town"

This means:

- The Town should place an extremely high priority on dealing with traffic issues in Concord.
- The Town should adopt a multi-stage and multi-faceted implementation process, starting with a set of low-cost/high-impact recommendations
- The Town should endeavor to apply our recommendations in a "progressively phased" approach.
- Relevant Town Departments and Committees should adopt the philosophy regarding Y-intersections outlined on pages 15-17. This means, in part, that any changes in a Y-intersection should not be made without weighing such factors as accident history, physical setting, history, costs, and aesthetics.
- The Town should be open to the use of traffic-calming measures, especially those discussed in the Traffic-Calming Toolbox (Appendix II). This includes, but should not be limited to, speed humps, chicanes, one-way streets, edge-lines, four-way stops and neck-downs

- The Town should make known its overall progress in traffic management through easy-to-access publications.
- The Town should create a staff-based traffic-management and traffic-calming coordination group. A tentative name for this group is the Traffic Calming Group (TCG)
- The Town should adopt a set of procedures for residents to bring traffic-calming issues before the above-mentioned coordination group. We recommend that requests for "quality of life" improvements be supported by a petition of at least 60% of the households on affected short streets. For longer streets (50 or more houses), at least 15 individual households need to sign the petition.
- The Traffic Calming Group should adopt the set of criteria outlined on pages 13-15 of this report to assist it in deciding what action to take regarding traffic-calming issues. In particular, these criteria will look at the severity of the problem, alternative solutions, potential benefits, and the costs and/or difficulties involved in solving the problem. These criteria need to be applied on a case-by-case basis.

Coordination Outside of Concord

- The Town of Concord should work with MassHighway and the Corridor Advisory Committee to speed implementation of improvements to Route 2, beginning with Crosby's Corner and the Rotary.
- The Town of Concord should coordinate with other regional organizations and towns and work to set up a forum to discuss and establish regional traffic-calming policies and goals

Education of the Town Concerning Traffic Calming

The Town of Concord should:

- Invite the City of Cambridge Traffic-Calming Officer to present her approaches and findings to the Board of Selectpersons and other relevant Town Committees to increase their understanding of the issues and opportunities involved in traffic calming
- Review legal cases to understand how to implement traffic-calming measures
- Familiarize itself with the implementation of traffic-calming measures in other towns

Overview

As the Town of Concord moves into the next millennium, our residents are faced with several threats to our open and rural character and to our high quality of life. One comes in the form of traffic, mainly from outside of Concord, which is clogging up our streets and hurting the residential fabric of our neighborhoods. The open and rural character of Concord has been a core part of our 365-year history. This character is at the heart of much of the philosophy emanating from Concord authors such as Thoreau, Emerson & Alcott. It symbolizes what we prize in our historic town. Related to this is the high quality of life that Concordians have enjoyed by being part of a town whose population has not grown significantly for many years.

For these reasons, firm action to protect Concord is crucial. In this report we make recommendations as to what needs to be done. In doing so, we continue a long tradition of citizen

Transportation Plan Committee believes that it is also necessary to take a proactive role to protect the quality of life of its residents by attempting to minimize cut-through traffic.

Previous studies, while limited in scope, indicate that more than one-half of Concord traffic, especially in peak hours, is through trips. This is due to Concord's location in the region, the absence of major arterials other than Route 2 serving the neighboring towns and Concord's roadway system that provides more direct routes than Route 2. Based on the 1990 Journey-to-Work U.S. Census information, employment opportunities in Concord attract a work force from communities to the east and west by nearly a 2:1 ratio over communities located to the north or south. Concord residents have found employment outside Concord and commute in an east-west orientation to their jobs by a 4:1 ratio over those who work to the north or south. These travel characteristics account for somewhat lower traffic volumes carried on minor arterials and collectors with a north-south orientation vs. the daily volumes carried by east-west roadways. Not including Route 2, which carries in excess of 30,000 ADT, Route 62, Elm Street and Lexington Road carry volumes of 10,000-20,000 ADT while the arterials and collectors with an approximate north-south orientation carry less than 10,000 ADT.

In the past, the predominant east-west travel through Concord was explained by the communities' populations west of Boston and the major attractions in the Boston metropolitan area. More recent population growth is taking place northwest of Concord, and it may be expected that there will be a shift in through trips to a more northwest-southeast direction. Based on population data obtained from the Massachusetts Municipal Association (see Table 1), the greatest percentage increase in population in the communities around Concord occurred in the northwest. Towns such as Dunstable, Groton, Tyngsborough and Westford experienced annual growth rates exceeding 2%. Communities surrounding Concord in the other directions have experienced a more modest growth rate, generally under one percent.

Classified by their origin & destination, there are four types of trips in Concord:

- Local trips, originating and ending in Concord
- Through trips, originating outside Concord and with destinations outside Concord.
- Local to regional trips, beginning in Concord and ending outside Concord. Of 7,575 employed Concord residents, as reported in the 1990 Census, 73% had a workplace outside Concord.
- Trips beginning outside Concord and ending in Concord. For work-related trips only, the 1990 Census reports 12,800 workers in Concord, of whom 2,047 reside in Concord. Residents of other communities who work in Concord include the following (over 200 total):

Acton	907
Maynard	692
Leominster	377
Boston	325
Chelmsford	324
Lowell	318
New Hampshire	303
Worcester	272
Littleton	269
Westford	261
Fitchburg	240
Framingham	240
Lexington	236
Boxborough	204
Carlisle	202
TOTAL:	4,930

The total number of employees for these 15 communities is 4,930. When added to the Concord resident employees, the total is 6,977 or just over one-half the employees in Concord. The other half comes from more than 141 other locations including other states.

The geographic diversity of the work force in Concord, at businesses whose employment and taxes help support the Town, indicates how important transportation is to the Town and the region's economy.

Issues & Problems Created by the Current Traffic Situation

The current traffic situation may create a number of significant safety hazards and other detrimental impacts on our town. In particular, the congestion and use of Concord streets as cut-throughs may result in the following:

- ❒ Increase in the risk of physical harm and death for occupants of vehicles, pedestrians, bicyclists, and others on Concord roadways

approach, but a "NIOLBY" tact ("not in our local backyards"). We want all towns to join us in agreeing on this philosophy and then taking concerted action to achieve our shared goals.

Structure and Process for Developing and Implementing Solutions

Moderate Approach

We are recommending a multi-stage and multi-faceted implementation process. The first stage consists of immediately initiating a set of low-cost/high-impact recommendations, since the budgeting process for next year is already so far along. In the next fiscal year we recommend the addition of a half-time traffic engineer who would help with additional implementations and plan for further action steps. In the following fiscal years, the Town would provide funding for the recommendations that flowed from the various resident petitions, plus the recommendations of the Engineer. Another facet of our proposal is a set of recommendations to make sure that the various town departments, committees and rules and regulations place appropriate emphasis on traffic calming and traffic management. Naturally, we believe that the Town should give an extremely high level of priority to dealing with the traffic issues in Concord.

In terms of Town departments and committees, we have a variety of recommendations. First, the Board of Selectpersons (BOS) shall review the charges of all relevant Committees, and where appropriate, modify them to include appropriate charges related to traffic calming and management. Similarly, the BOS shall establish annual goals and plans around traffic calming and management for these committees, and relevant Town departments as well. One potential way to change the existing process is to take some of the philosophy and tools from the report and update the Public Works Commission's roads policy statement. Each year relevant committees and departments shall document the progress made toward these goals and objectives in their annual reports and/or reviews. Additionally, include in the yearly Roads Program a staff review session where other staff look at traffic issues and how and where they fit into the Roads Program. In addition, the Public Safety Officer shall prepare an annual report that includes, among other matters, an examination of pedestrian safety, the quality of life related to traffic issues and hot spots for speed, etc. Effort shall be made to see that the overall progress toward traffic calming and management is made known to the residents of the Town through easy to access publications.

In terms of rules and regulations, the zoning by-laws and subdivision rules and regulations should be amended to integrate traffic calming into relevant portions of the rules. This shall include transportation linkage for developers and the requirement of a traffic impact analysis and mitigation proposal.

In terms of responding to residential traffic concerns, the Town should create a staff-based traffic-management and traffic-calming coordination group (previously labeled "TCG"). This would consist of the Town Safety Officer, Town Engineer, a member of the Fire Department and a member of the Planning and Land Management Staff. This group would handle petitions based on processes delineated below and would recommend action steps. During the first year of operation and with a minimum budget, the action steps would be based on a philosophy of minimum cost but with the highest impact possible. Assuming that institution of a traffic management measure addresses the situation, additional coordination and oversight of the installation of said measures, as

Budgeting

Moderate Budget, but No Part-Time Engineer

A subcommittee of the Transportation Plan Committee has prepared a budget for a moderate-scale implementation of our recommendations regarding staff time, and based on an informal staff group (the TCG) for handling the issues. This moderate option represents a preliminary step in implementation of what we hope develops into a full-scale plan. During the upcoming two years part of the output would be a plan and budget for implementing further recommendations.

Costs include provisions for CPW staff to perform investigations of the sites, perform research and provide assessments on the impacts of potential solutions, compile reports and plans and attend monthly meetings. Assuming that institution of a traffic management measure addresses the situation, additional coordination and oversight of the installation of said measures, as well as follow up and tracking of the projects, will be necessary. We have conservatively estimated the Engineering effort at 30-40 hours/month, although it may realistically require a level of attention equivalent to a 0.5 Full Time Employee (FTE), which would equate to $20,000/year. Planning and Land Management staff would also need to review the proposals and attend the meetings. Again, with this scenario, they would also have to absorb the entire cost of staff time in their budget. We estimate this effort at $5000/year. Another budgetary consideration is that of the Highway staff having to install and maintain these measures over the long term. Depending on the complexity (portable speed humps, etc.), this could represent a considerable effort. We conservatively place this effort at another $5,000/year. All in all, we estimate the "real" cost of this minimal effort to be approximately $42,200/year or about $7/household (based on approximately 6,000 homes in Concord).

Moderate Budged Based on Hiring a Part-Time Engineer

A more comprehensive moderate approach would be to acquire the services of a traffic engineer to perform studies, review options and recommend solutions on a time and materials basis. His or her work would still need to be coordinated and reviewed by staff, but this effort is somewhat less than the aforementioned tasks. Based on the 30 hours per month effort listed above, and at a market rate of approximately $100/hr, this would entail a funding level of $36,000 annually. Material costs would exist, again estimated at $5,000/year for striping and signage. But once again, staff costs must be factored in as marginal costs in some way to give a proper representation of the "true" cost of providing this service to the town. We have assumed $15,000/year in staff support (police, engineering, planning and highway). This yields a total estimated cost of $56,000/year. By way of comparison, a staff engineer earns approximately $45,000/year or $11,000 less than the estimated cost of a consultant (based on the 30 hours/month conservative scenario). Obviously there would be much higher costs if more elaborate traffic management measures are instituted. These could be increased Roads Program costs, Capital Improvements budgets or CPW operating budgets.

Minimal Budget Based on a No-Build Scenario

A minimal approach might simply consist of striping and some signage. We estimate an initial materials budget of $5000/year. This will still entail work on the part of CPD to accept the requests, visit the streets, canvas the neighborhoods, perform traffic counts, report the findings and attend the

- ❒ The Town should work to advance Route 2 improvements that reduce the current volumes of through traffic that currently divert off Route 2 onto local streets
- ❒ The Town should mount an organized and well-publicized campaign for traffic calming that helps educate our residents to its benefits
- ❒ The Town should consider amending the zoning by-laws and subdivision rules and regulations to permit more flexible street width requirements and separate sidewalk-width specifications
- ❒ The Town should implement decisions involving the use of traffic-calming measures on a case-by-case basis based on a consideration of all the factors discussed in this report

General Recommendations on Traffic Calming

Below is a list of traffic-calming measures that are frequently employed by other municipalities in the United States, Europe and Australia;

- ❒ Employ road humps, speed tables and their variations whenever possible, appropriate and feasible
- ❒ Designate certain cut-through streets either one-way, or "no entry allowed" or "no turns allowed" at certain times of day
- ❒ Narrow streets by physically reducing their size or using pavement markings
- ❒ Decrease speed limits
- ❒ Intensify enforcement of the traffic laws
- ❒ "Share the Pavement" and slow traffic on streets through the use of chicanes, street neckdowns, staggered parking, etc. (see *Appendix II - Traffic Calming Toolbox* for definitions and explanations)
- ❒ Utilize frequent stop signs and four-way stops
- ❒ Make use of "edge lines" to narrow the traveled portion of the road
- ❒ On a long-term basis, enact at Town Meeting a "Scenic Roads" by-law and designate various roads as "Scenic Roads" to prevent further widening, straightening and other improvements that would increase traffic and decrease safety

Cut-through Traffic

Many local streets in Concord carry excessive traffic volumes because of cut-through traffic. The Town's Transportation Committee has developed a clear transportation philosophy "To protect the quality of life of its residents and to provide for their safety in keeping with the open, rural and historic character of the Town". Therefore, action must be taken to reduce or eliminate the cut-through traffic on a number of local roads.

In this report we do not present specific recommendations for any particular area of Town. What we propose here is a philosophy and framework for dealing with problems. Our approach is to start with the least invasive, least expensive remedies possible. Only if these do not work, do we recommend then moving to moderate, possibly more intrusive actions.

- Financial costs
- Resource drains
  - Implementation of any plan will require town resources. A trade-off will have to be made in terms of how those resources might otherwise be used
- Political/practical/historical issues
  - Degree of difficulty in obtaining neighborhood support
  - Degree of difficulty in obtaining the support of other towns, where required
    - On January 7, 1987, the Governor signed Chapter 689 of the Acts of 1986 which affects the MassHighway's responsibilities pertaining to issuance of traffic regulation permits. With seven exceptions, cities and towns became able to vote and install traffic control devices without receiving approvals from the State. The seven exceptions are as follows:
      - Speed zoning
      - Regulations pertaining to traffic control agreements (specific provisions) and amendments to existing agreements
      - Heavy commercial vehicle exclusions
      - School zones where direct state funding is provided
      - City/town ways at their intersection with State Highway
      - Mid-block one ways
      - One ways on ways which connect adjoining communities

Therefore, if a traffic calming solution involves one of the seven items above, MassHighway must become involved. Even without MassHighway controls, it is only good relations with neighboring towns to work cooperatively. For example, Concord might effectively close off a road to the eastbound morning traffic only to find a neighboring town was diverting the afternoon traffic into Concord.

  - A potentially important fact is whether the particular cut-through has always been a cut-through or whether it has become one because of a change in some other roadway, e.g., paving West Street has led to the problem on Westford Road

Note: There may be various permutations of the above criteria. It may be useful to have a "Quick & Inexpensive Solutions" group. For example, where two streets intersect and a third local street joins them as the hypotenuse of a right triangle, that street may provide an ideal shortcut to avoid the intersection (e.g., Plainfield Road/Wheeler Road as a way of avoiding the Sudbury Road/Route 117 intersection and light). However, simple turn restrictions at the right time of day can effectively eliminate the problem.

Y-Intersections

History

Approximately 20 significant Y-intersections exist in Concord. These intersections are a reflection of a time when cart paths were created to move goods, animals and people among outlying farms and modest town centers. Unlike more recent communities that were planned with streets and

- ❒ Is the intersection in a rural or in-town setting?
- ❒ What are the costs of various solutions?
- ❒ Aesthetic and historic considerations?
- ❒ In what directions do the prevailing traffic turn?
- ❒ Is the major issue traffic backup or traffic accidents?

List of Significant Y-intersections (includes some "T"s and 4-ways)

- ❒ Lowell Rd. @ Westford Road
- ❒ Bedford Street @ Old Bedford Rd.
- ❒ Lexington Rd. @ Cambridge Tpk.
- ❒ Walden St. @ Thoreau St.
- ❒ Main St @ Elm St.
- ❒ Upland Rd. @ Harrington Ave.
- ❒ Sudbury Rd @ O.R.N.A.C.
- ❒ Commonwealth Ave. @ Laws Brook Rd.
- ❒ Commonwealth Ave. @ Church St.
- ❒ Lexington Rd- @ Old Bedford Rd.
- ❒ Fairhaven Rd. @ Sudbury Rd
- ❒ Main St. @ Sudbury Rd
- ❒ Sudbury Rd. @ Garfield Rd.
- ❒ Main St @ O.R.N.A.C.
- ❒ Spencer Brook Rd. @ Westford Rd.
- ❒ Harrington Ave. @ Old Marlboro Rd.

Route 2

Making Route 2 a continuous road without a rotary or signaled intersections will do more to solve Concord's traffic problems than any other single action. Obviously, however, this is a long-term project.

If Route 2 had been improved to Interstate System standards, as proposed in the 1960s and 1970s, the Town's problems with cut-through traffic would be significantly less. Without the Route 2 rotary and other signaled intersections on Route 2, traffic would not need to use the many cut-throughs such as Laws Brook Road and Westford Road.

Unfortunately, many issues developed that delayed the Route 2 improvements initially proposed: a 68-foot median that might well have been 24-feet; cloverleafs rather than diamond interchanges, the latter requiring much less land, etc., and other measures requiring much less land taking. Further, the state ran short on highway funds, preventing consideration of other alternatives.

The situation today, in 2000, again in the face of limited highway funding and to keep impacts to a minimum, is to make improvements, one by one, at the major intersections on Route 2. This process is already underway at Crosby's Corner. The Town of Concord has joined with the Town of Lincoln as an active participant in the design of the grade-separated interchange.

Traffic Calming and Traffic Management as Vehicles for Solving Our Problems

Values, Benefits

Although traffic calming techniques have been used in Europe and Australia for over 30 years, they are still a relatively new concept in the U.S. In some U.S. communities (Portland, OR and Cambridge, MA) traffic calming techniques have been used for over 20 years before they acquired the term of "traffic calming". Not only has there been much interest in calming in many communities both large and small across the U.S., but the engineering profession has also embraced this "new" tool. During the last five years, the topic of traffic calming has been featured in the annual conferences of the Transportation Research Board (TRB) and the Institute of Transportation Engineers (ITE). Numerous sessions have been offered on the subject at each conference, and they all have been well attended.

Traffic calming is part of the change in the way that transportation systems are viewed. Transportation is becoming more multimodal and sensitive to the social costs of automobile use. What was once the goal of increasing speed and capacity has now been moderated with other concerns and goals. Traffic calming is the act of integrating the traffic flow so that it properly interacts with the surroundings; to try and relocate the traffic to where it properly belongs and to try and slow the traffic so that it travels at a speed that is safe for the surrounding environment..

Currently, in the U.S. there are limited guidelines and standards available for traffic calming devices. In the traffic engineering profession, there are primarily two books ("bibles") that are used as the ultimate guideline for roadway design. These two books are Manual on Uniform Traffic Control Devices (MUTCD) developed by the Federal Highway Administration and A Policy on Geometric Design of Highways and Streets developed by the American Association of State Highway and Transportation Officials (AASHTO). For traffic calming, these books are not very useful. Since there aren't any guidelines for traffic calming, communities must make design and implementation decisions very carefully. The U.S. and Canadian branches of ITE are in the process of implementing separate general guidelines for traffic calming devices; however, these reference materials will have limited design guidelines.

In most communities a rush decision is not made to implement traffic calming devices. Before the installation of any device, an engineering study is conducted to determine the problem and address the problem in the least intrusive way. In most communities there are a series of meetings between neighbors and city/town officials. In many cities, a majority neighborhood consensus (two-thirds) must be reached before a device is considered. The local fire and police departments, as well as emergency response services, are generally consulted to obtain their input. These departments are generally concerned with fire truck and other emergency vehicle access through the traffic calming devices. If the device is restrictive to these services, another alternative is considered. A trial period (generally one year) is issued during which temporary traffic calming devices (for example, barriers, painted barrels, potted planters, signs and striping) are installed. After the one-year period, a follow-up study is performed to determine if the device was successful. If successful, a permanent structure is usually built. In cases of speed control devices, the 85%-ile speed would need to be significantly reduced for the installation of a permanent device. In any case, once a traffic calming device is considered for use it must be appropriately designed and signed. In general, traffic calming devices

Examples of improvements include neckdowns and raised crossings. Residents abutting or affected by a particular project may attend Town Hall meetings or channel their concerns through the transportation board. The Town desires that a project be in place for six months or one year before it is assessed; in addition, the Town's policy describes several "pre-approved" calming devices such as speed bumps, street closures and half closures, diverters, and median barriers. An important issue to the Town is possible traffic diversion resulting from any new improvements. Is traffic on adjacent roadways affected by the improvement, and to what degree? Additional issues that are especially of interest to the Town of Concord include preservation of historical characteristics of a given area, and compatibility of traffic improvements with surrounding land uses and aesthetics. The Town of Brookline attributes much of the success of traffic calming efforts to the strong involvement of local residents who are quite active in the decision-making process, not only through the transportation board and Town Hall meetings, but also through local neighborhood meetings and letter-writing campaigns.

The City of **Newton**[3], is a third example where traffic officials have devised and are in the process of finalizing written policies and guidelines regarding traffic calming. The traffic calming program is restricted to local roadways (having volumes of less than 800 vehicles per day, primarily in residential areas). Currently, the City uses a ranking process (Levels 1 through 4) to decide on appropriate traffic calming measures. The City has a Traffic Committee which meets regularly to address current issues, and through which concerns can be channeled. Recent implementations of neckdowns and a roundabout are now being studied. The City is working on measures of effectiveness that are to be used to assess success. Variables such as speed and percentage of traffic diversion are generally documented. The City utilizes neighborhood and other meetings to solicit input from residents, emergency teams (fire, police), business owners, and others. The City also keeps up with new products and technologies (such as "superflex" rubber) and pays attention to aesthetic concerns.

On a national level, the City of **Portland, Oregon**, is widely regarded as the best example of traffic calming innovation and implementation. Various measures have been devised to raise awareness of possible traffic problems and solutions, encourage involvement and collaboration by different groups, and research and assess new devices and technologies. Past projects have been well documented, and awareness of legal issues and implications is also encouraged. The breadth of the City's comprehensive traffic calming program is most easily seen by accessing the program's internet web site, at www.trans.ci.portland.or.us/traffic_management/trafficcalming. The program's mission statement includes the following core objectives:

- Enhancing neighborhood livability and sense of community by reducing excessive speeding and excessive vehicle volumes on local service streets.
- Encouraging reasonable and responsible driver behavior through education and emphasizing personal responsibility.
- Enhancing traffic safety for pedestrians, providing special attention to the safety of children in school zones.
- Encouraging public transportation options and the use of the arterial system for through traffic.
- Encouraging broad citizen participation by providing service in a responsive, timely, and professional manner.

[3]Conversation with R. LaMotte, City of Newton Engineering Department, 7/21/99.